MC 80 DX
Microscope Camera

Operating Manual

Familiarity with the contents of this manual is a prerequisite for operating the equipment. Therefore study the manual carefully. In particular, it is imperative that you observe all warnings and notes concerning safe use of the equipment.

Reflecting technical upgrading of the equipment, the descriptions and instructions contained in this manual are subject to change without prior notice or automatic updating.

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Perfect Micrographs in a Few Steps

Before the first startup, read the section "Safe Use of the Equipment", the description in Chapter 1, and the installation and operating instructions in Chapter 2!

(1) Switch the MC 80 DX (installed on the microscope) on (the switch is on the control console.

⇒ For further information, see section 2.2.

(2) Attach film cassette (with film inserted) onto the microscope camera.

⇒ For further information, see section 2.1.

(3) Select specimen detail and focus.

⇒ For further information, see section 2.8.

(4) Fully automatic exposure control

Press **<AUTO>** button.

(5) Enter exposure correction for the respective microscopy method.

Press **<DOWN>** button.

(Bright features on a dark background, set DF/FL - 2.)

or

Press **<UP>** button.

(Dark features on a bright background, set BF +1.)

(6) Release micrograph exposure

Press **<START>** button. Finished!

Start with step (3) to take the next micrograph,

or

Rewind film and end micrography session.

For further information, see section 2.1.2.

Safe Use of the Equipment

The MC 80 DX Microscope Camera including its original accessories may only be used for the photomicrographic documentation techniques described in this operating manual.

The manufacturer will not assume liability for any malfunction or damage caused by any other than the intended use of the MC 80 DX or individual modules or parts of it, nor by any repair or other service operation performed or attempted by persons other than duly authorized service staff. Any such action will invalidate any claim under warranty, including for parts not directly affected by such action.

Mind the following notes and instructions in particular:

The MC 80 DX Microscope Camera has been designed, built and tested in conformity with the standards DIN EN 61010-1 (IEC 1010-1) "Safety requirements for electrical instrumentation and control and laboratory apparatus", the relevant requirements of the EC directives 73/23 (Annex 1) and 89/336, and current German electromagnetic compatibility legislation (1992). This manual contains information and warnings that must be observed by the user.

The MC 80 DX Microscope Camera is a Protection Class I instrument and has an enclosure of type IP 20. The mains plug may only be inserted into a properly installed, grounded socket outlet. Electrical protection must not be impaired by using an extension cord without grounding conductor.

The control console of the MC 80 DX is provided with certain protective devices. Users must familiarize themselves with these devices and use them. These devices must not be removed.

Before switching the equipment to power, check whether it is fit for the local line voltage. Permissible line voltages range from 100 to 240 V a.c, 50/60 Hz. Always pull the power plug before opening the equipment or changing a fuse!

When changing a fuse, make sure to use only fuses of the specified type and current rating. It is not permitted to use makeshift fuses or short-circuit the fuse holders.

If the protective measures are found to be no longer effective, the equipment must be switched off and safeguarded against inadvertent operation. For repair, you must contact an authorized service workshop or the manufacturer.

Soiling and dust may deteriorate the proper function of the equipment You should therefore protect it against such influences as far as possible. Put the dust cover over the microscope and camera whenever you are not going to use them for some time.

Do not cover the ventilation slots on the control unit, and do not allow them to get clogged by dust. Otherwise heat will accumulate inside the unit, which may damage the circuitry or, in extreme cases, set it on fire. Always check whether the equipment has been switched off before putting the dust cover on it.

The equipment may only be operated by staff who have been properly instructed about the use of the camera and microscope and the potential dangers involved in this use in general and the respective application in particular.

Mind that the MC 80 DX is a high-precision optical instrument. Inexpert use or unauthorized attempts to repair or modify it may easily impair its function or even damage it.

Maintenance, repairs, modifications, removal or exchange of components, or other interference with the equipment beyond the operations described in this manual may only be carried out by Carl Zeiss service agency or by personnel expressly authorized by Carl Zeiss to do so.

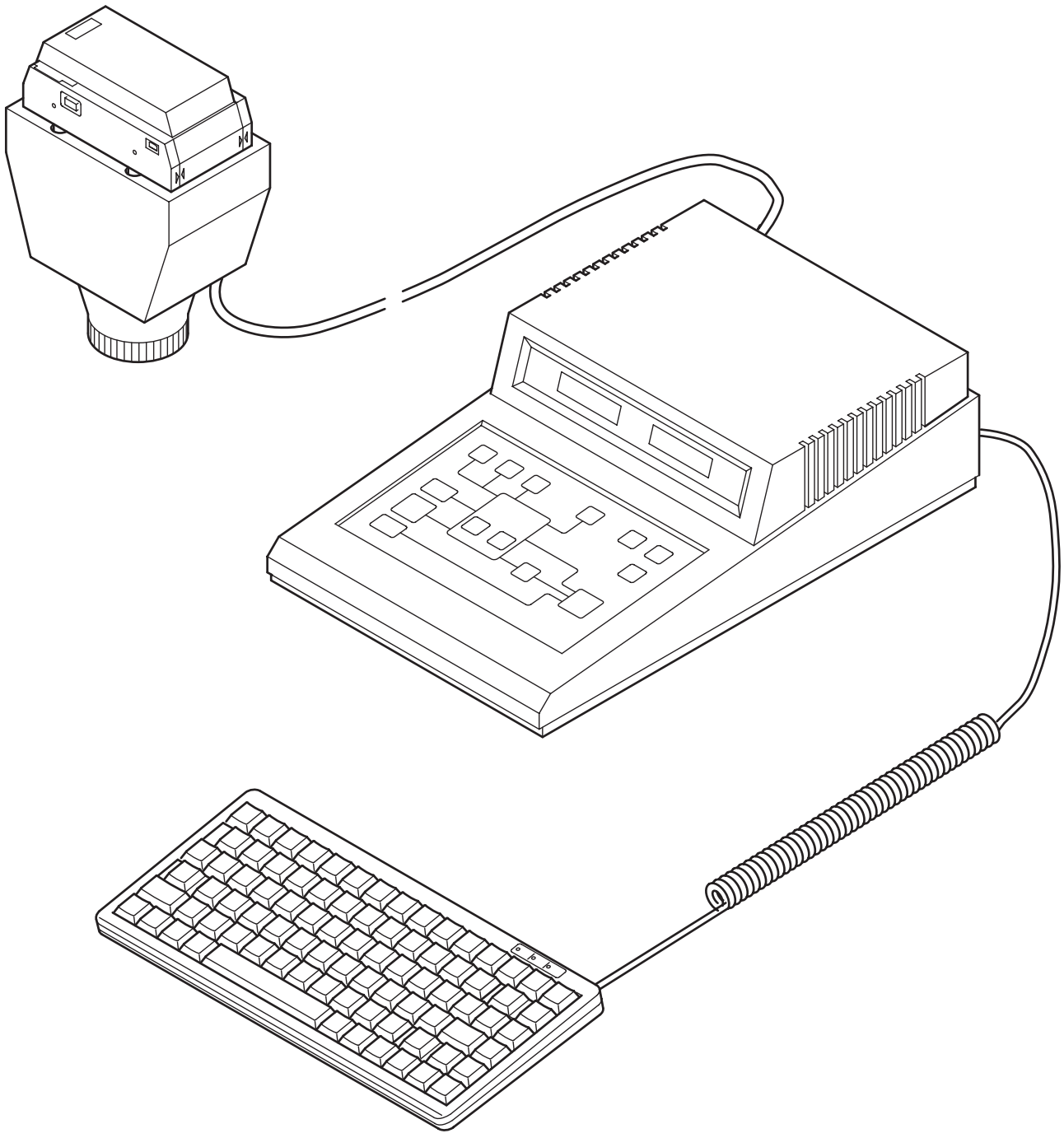
Notes on Warranty

The manufacturer warrants that the product has been supplied in a state free from defects of material and/or workmanship. It is imperative that you report any defect to the manufacturer immediately and do everything to minimize the damage. Upon a defect being reported within the warranty period, the manufacturer is obliged to remedy the defect; at his sole discretion, this may be effected either by repair or replacement. The warranty does not cover any defects caused by natural wear, especially in case of wearing parts such as fuses.

The manufacturer of the unit cannot be held liable for damage resulting from operating errors, negligence or unauthorized tampering with the equipment, particularly as the result of removal or replacement of parts of the unit or as the result of the use of unsuitable accessories of other make. Mind that any such action will render all warranty claims null and void.

With the exception of the work specified in this manual, no maintenance or repair of the MC 80 DX may be performed. Repairs may only be performed by Carl Zeiss Microscopy Service staff or specially authorized personnel. Should any defect occur with the instrument, please contact the Carl Zeiss Microscopy Service in Germany (see page 3-5) or your local Carl Zeiss agency.

Overall View of the MC 80 DX Microscope Camera



DESCRIPTION

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1 DESCRIPTION

1.1 Designation, Intended Use

Model designation: MC 80 DX Microscope Camera

The MC 80 DX Microscope Camera is a photomicrographic camera, which fits all Zeiss microscopes having a standard camera port.

1.2 Equipment Description

The MC 80 DX Microscope Camera fits to the standard camera port of Zeiss microscopes via a camera adapter sleeve. There are different adapters, to be used depending on whether the microscope has a camera port for 60 mm or 44 mm image distance.

All camera functions of the MC 80 DX are controlled through a control console with a clearly arranged operating panel providing operator guidance. Its automatic exposure function and easy operation makes the MC 80 DX ideal for photomicrographic routine.

The MC 80 DX provides the following functions:

- Automatic exposure, with exposure metering averaged over the central 30% of the frame.
- Automatic reading of the ISO film speed rating from DX-coded 35 mm film cartridges.
- Automatic film leader winding and film advance; power rewinding.
- Method-specific exposure corrections (+2 ... -3 exposure increments).
- Saving of the automatic exposure time for comparison micrographs.
- Manual setting of exposure times, multiple exposure and TIME mode.
- Date exposure with D4 Databack.

1.3 System Overview

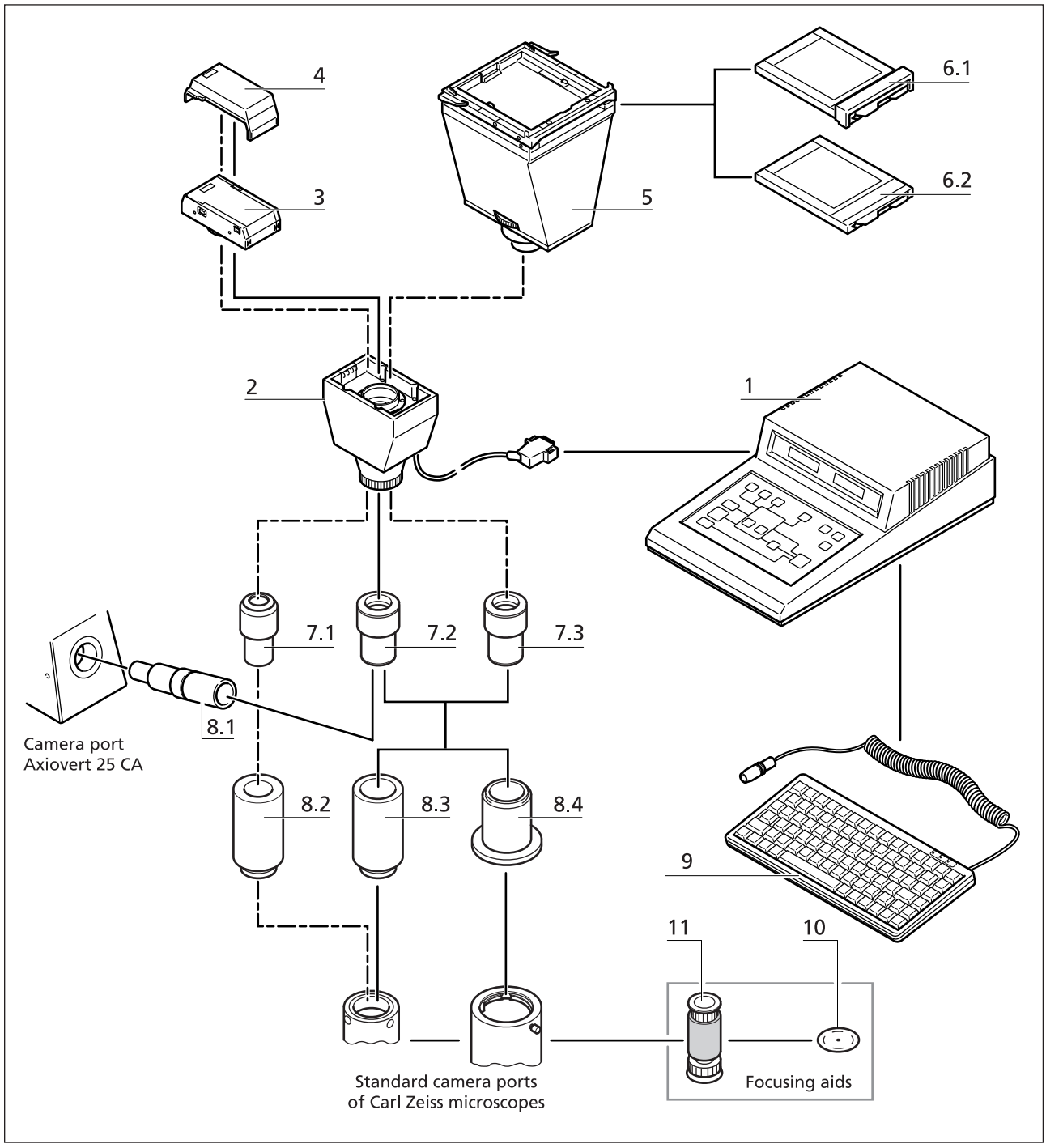

Fig. 1-1 MC 80 DX Microscope Camera outfit

MC 80 DX Microscope Camera outfit		**Catalogue No.**
1	MC 80 DX control console	456048-0000-000
2	MC 80 DX camera body	456031-0000-000
3	35 mm Mot DX film cassette	456071-0000-000
4	D4 databack	456073-0000-000
5	M 4 × 5" large-frame attachment (MC 200 CHIP / MC 80 DX)	456060-0000-000
6.1	Polaroid film-pack holder 545 Polaroid film-pack holder 550	416128-0000-000 416127-0000-000
6.2	Double sheet-film holder	416131-0000-000
7.1	PK 2.5× projection lens	456020-0000-000
7.2	P 2.5× projection lens	456021-0000-000
7.3	P 10× projection lens	456023-0000-000
8.1	Photo adapter 1.0× MC 80 DX – (Axiovert 25 CA)	451271-0000-000
8.2	Camera adapter for Microscope Camera (dia. 23.2 mm)	456002-0000-000
8.3	Camera adapter for Microscope Camera (image distance 60 mm)	456006-0000-000
8.4	Camera adapter for Microscope Camera (image distance 44 mm)	452996-0000-000
9	Ultraflat keyboard (option; for exposure of numerals, text and scaling bars)	419195-9066-000
10	Frame size reticle MC 2.5× / dia. 26 mm Frame size reticle MC 2.5× / dia. 21 mm Frame size reticle MC 2.5× / dia. 19 mm	454075-0000-000 454025-0000-000 476021-0000-000
11	Monocular prism telescope 3 × 12 B	522012-0000-000

1.4 Overview of image positions (tube connections), appropriate camera tubes and microscope stands

Image position (tube connection)	Cat. No. of camera tube	Microscope stand
60 mm	452902-0000-000	KF 2, Standard 20 / 25
	452929-0000-000	KF 2 ICS, Standard 25 ICS, Axiostar
	452909-0000-000 452941-0000-000 452970-0000-000 452974-0000-000 450960-0000-000 450962-0000-000 450963-0000-000 450964-0000-000	Axiolab / Axiolab A / Axiolab Pol
	455005-0000-000	Stemi DRC
	455080-0000-000 455081-0000-000 455082-0000-000	Stemi SV 6 / SV 11 / SV 11 Apo
	455053-0000-000 455055-0000-000	Stemi 2000-C / 2000-CS
	452934-0000-000	Axiotech / Axiotech vario
	451321-0000-000 451322-0000-000 451324-0000-000 451325-0000-000	Axiovert 100 / 135 / 135 M
	452947-0000-000 452972-0000-000	Axioskop
	452342-0000-000 452344-0000-000	Axioskop 2
	452142-0000-000 452143-0000-000 452145-0000-000 452146-0000-000 453020-0000-000	Axioplan 2

Image position (tube connection)	Cat. No. of camera tube	Microscope stand
44 mm	452910-0000-000 452911-0000-000 452912-0000-000 452914-0000-000	Axioskop / Axioskop 20
	451722-0000-000	Axiovert 10 / 35 / 35 M
	452920-0000-000 452921-0000-000 452923-0000-000 452925-0000-000 452926-0000-000 452930-0000-000 452931-0000-000 452932-0000-000	Axioplan / Axiotron / Axiotron 2
	452146-0000-000	Axioplan 2
Clamping diameter 40 mm	452903-0000-000	Standard 20 / 25
	451474-0000-000	Multi-observation equipment
	473024-0000-000	Universal, Photomikroskop
	475083-0000-000	Stemi SR / SV 8
	475084-0000-000	Stemi DRC; alt
Special adapter		Front-port Telaval 31
		Front-port Axiovert 25 C / CFL / CA
		Front-port Axiovert 200
T2 adapter		Front-port Axiovert 35 / 35 M / 135 / 135 M

1.5 Specification

(1) Dimensions (Width × Depth × Height)

MC 80 DX camera body ..... 130 × 85 × 150 mm
35 mm Mot DX film cassette ..... 115 × 40 × 65 mm
D4 databack ..... 112 × 45 × 53 mm
M 4 × 5" large-frame attachment ..... 175 × 175 × 245 mm
MC 80 DX control console ..... 220 × 350 × 105 mm
Keyboard ..... 280 × 139 × 25 mm

(2) Weights

MC 80 DX camera body ..... 1.4 kg
35 mm Mot DX film cassette ..... 0.25 kg
D4 databack ..... 0.05 kg
M 4 × 5" large-frame attachment ..... 1.85 kg
MC 80 DX control console ..... 2.55 kg
Keyboard ..... 0.4 kg

(3) Environmental Requirements

Storage and shipment (packed):

Permissible ambient temperature ..... -10 to +60 °C
Permissible relative humidity ..... 20 % to 85 % at +35 °C
Atmospheric pressure ..... 800 hPa to 1060 hPa

Operation:

Permissible ambient temperature ..... 0 to +45 °C
Permissible relative humidity ..... 20 % to 85 % at +35 °C
Atmospheric pressure ..... 800 hPa to 1060 hPa
Pollution degree 2

(4) Operating data

Installation ..... in closed rooms
Protection class I
Type of enclosure ..... IP 20
Electric safety ..... conforming to DIN EN 61010-1 (IEC 1010-1) allowing for CSA and UL regulations
Overvoltage category II
Radio interference suppression ..... conforming to EN 55011 class B
Noise immunity ..... conforming to EN 50082-2
Line voltage ..... 100...240 V, no conversion required
Permissible line voltage fluctuation ..... ±10 %
Line frequency ..... 50/60 Hz
Power consumption ..... about 25 VA
Line input fuse ..... for 100...240 V: slow-blow 2.5 A / 250 V
Clock function error ..... < ±2 minutes/month (25 °C)

OPERATION

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2 OPERATION

The MC 80 DX Microscope Camera comes packed together with its accessories. Remove all modules from their packing containers and check for completeness against delivery note. We recommend that you keep the packing containers for the event that you may have to relocate the equipment, return it to the manufacturer for repair, or keep it in a storeroom for some time.

It is important that you read the information on "Safe Use of Equipment" (page V)!

2.1 Equipment Installation

2.1.1 MC 80 DX Microscope Camera for 35 mm film

The equipment is designed to be installed by the user. Proceed as follows:

(1) Attaching the camera adapter

Insert camera adapter (2-1/**3**, **4**, **5**, **6**) for the MC 80 DX into the microscope's camera port (2-1/**7**, **8**, **9**) as far as it will go, and tighten setscrew (2-1/**10**) at the camera port. Mind the following assignment of adapters:

- Use the 44 mm image distance adapter (2-1/**5**) on camera ports with 44 mm image distance (2-1/**8**).
- Use the 60 mm image distance adapter (2-1/**4**) on camera ports with 60 mm image distance (2-1/**7**).
- Use MC 80 DX – 1,0× camera adapter (2-1/**6**) for the Axiovert 25 CA camera port (2-1/**9**).
- Use the 23.2 mm dia. adapter (2-1/**3**) on the trinocular tube 452902 (2-1/**6**) of the Standard 20/25 microscope (image distance 60 mm).

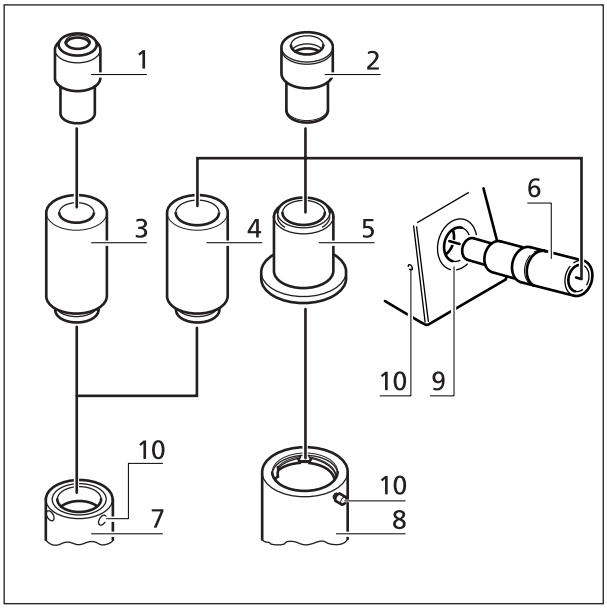


Fig. 2-1 Attaching the camera adapter and the projection lens

(2) Inserting the projection lens

Push the projection lens (2-1/**1**, **2**) into the camera adapter (2-1/**3**, **4**, **5**, **6**) as far as it will go. Mind the following assignment:

- Use projection lens P 2.5× (2-1/**2**) on 44 mm image distance adapter (2-1/**5**) or on 60 mm adapter (2-1/**4**) or on MC 80 DX – 1,0× camera adapter (2-1/**6**).
- With Standard 20/25 microscope: Use projection lens PK 2.5× (2-1/**1**) on 60 mm image distance adapter (2-1/**3**).

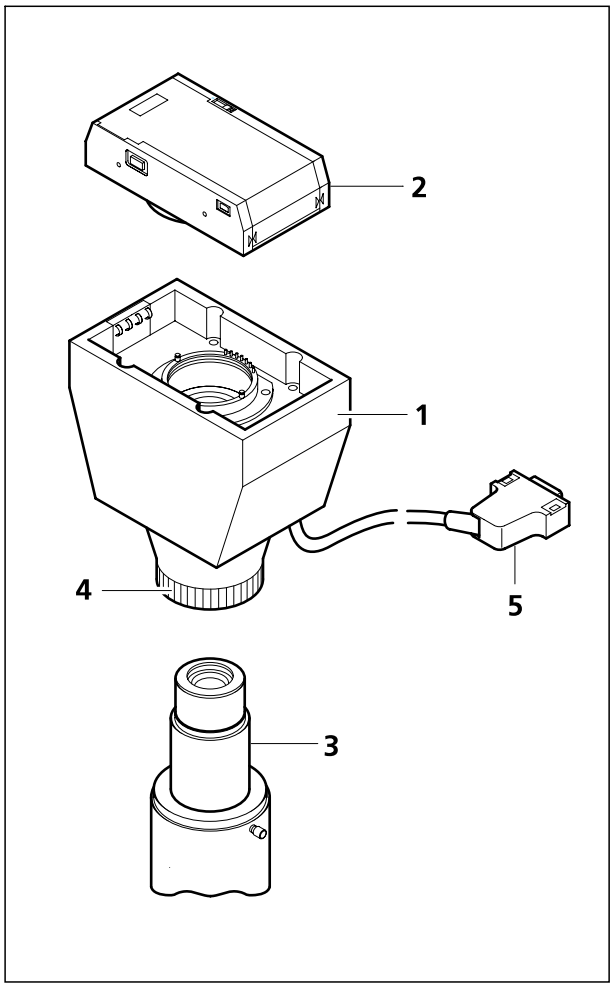


Fig. 2-2 **Attaching the camera body and the 35 mm Mot DX film cassette**

(3) Attaching the MC 80 DX camera body

- Attach the MC 80 DX camera body (2-2/**1**) on to the camera adapter with inserted projection lens (2-2/**3**), with the body aligned so that the product name and company logo face you. Push body down as far as it will go. Lock by anticlockwise turning of the clamping ring (2-2/**4**).
- Push plug (2-2/**5**) of camera body into the socket labeled CAMERA BODY on the control console (see section 2.2).

(4) Attaching the 35 mm Mot DX film cassette

- Attach the 35 mm Mot DX film cassette (2-2/**2**) on top of camera body so that the contact pins are firmly seated in the jacks (see section 2.1.2).

(5) Inserting the eyepieces

- Push the two focusing eyepieces (one without, the other with built-in frame size reticle) into the viewing ports of the trinocular tube as far as they will go. Align the eyepiece with frame size reticle so that the frame sides are aligned in parallel with the camera (see section 2.7).

2.1.2 The 35 mm Mot DX film cassette

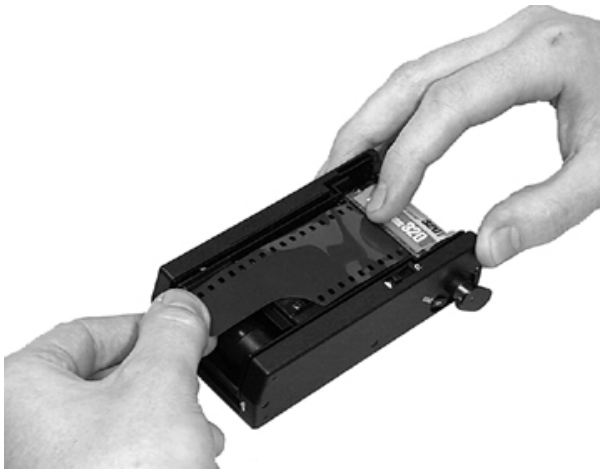
(1) Removing the film cassette

Use your two hands to grasp the film cassette on the right and left, press unlocking button (2-3/**2**) until stop using your thumb, and only then pull cassette off in upward direction.

For No. 135 (35 mm) film you may use film cartridges with or without DX coding. We advise you not to use bulk film (see section 2.8.1.2).

(2) Inserting the film

- Push locking slider (2-3/**11**) in arrow direction. This will cause the cartridge holding pivot (2-3/**10**) to pop out. Now the D4 databack or plain cassette back (2-3/**6**, **7**) can be removed.
- Insert cartridge (2-3/**8**) into cartridge compartment (2-3/**9**).



- Hold the cartridge in place with your index finger and pull out the film leader until the insertion marking is reached. Please do not touch the rubber cladding (2-3/**12**) with your fingers !

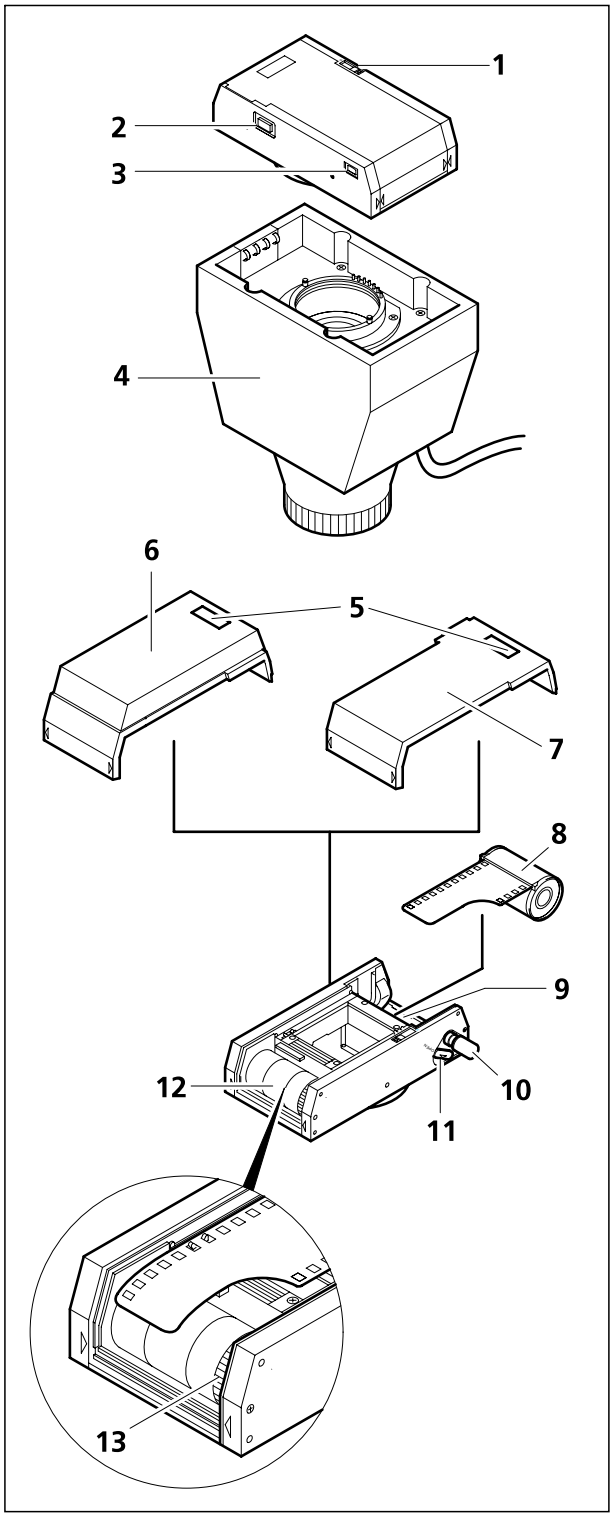
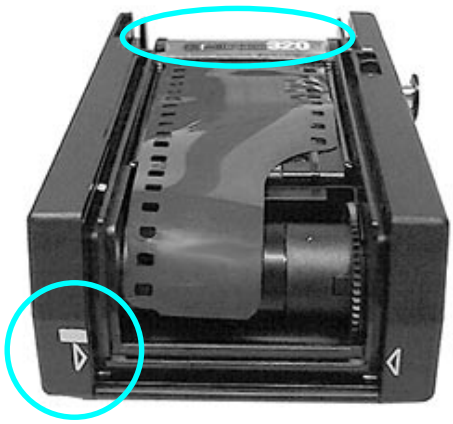


Fig. 2-3 35 mm Mot film cassette



- The film and the cartridge are lying flat on the support !

- The film leader is pulled out until the insertion marking is reached.

- Now, and only now, press in the cartridge holder !

- Insert plain back (2-3/**7**) or D4 databack (2-3/**6**) on left side (see arrows on the backs and on the cassette), close the cassette and lock the lid by pressing tightly. The mechanical frame counter (2-3/**3**) shows „S“ (Start).

(3) Attaching the film cassette

Hold film cassette with both hands on the right and left of the camera body. The unlocking button (2-3/**2**) shows to the user and must not be pressed during attachment. Hold the film cassette parallel to the upper edge of the camera body and insert it in the basic body (2-3/**4**) until the unlocking button (2-3/**2**) jumps out.

The film leader is wound automatically until the mechanical counter reads 1. After exposure of the first frame (and, if a databack is used, exposure of the data), the film is automatically advanced to the next frame. The mechanical counter (2-3/**3**) of the film cassette displays the current frame number. When the end of film is reached, the film advance motor is shut down; the left-hand display window of the control console shows the message "FILM END".

(4) Rewinding the film

Actuate slider "R" (2-3/**1**) to effect automatic rewinding. After removal of the film cartridge and reattachment of the cassette back or D4 databack, the slider automatically snaps to its film advance position.

Please remember to clean the spool after 60...80 films !

Carefully clean (remove remainders of lubrication) the rubber cladding of the take-up reel (2-3/**12**) after exposure of 60 ... 80 films or when problems arise with the film advance (motor is not switched off, mechanical counter (2-3/**3**) is not set to "S" = Start).

Cleaning agents: Q-tips and water with a little washing-up liquid.

- Set rewind button (2-3/**1**) to "R".
- Soak Q-tips in the water with washing-up liquid
- Use Q-tips to clean rubber cladding of the take-up reel, move reel by turning its knurled ring (2-3/**13**). If required, repeat cleaning procedure until the cotton remains clean.
- Dry humid rubber cladding using a dry Q-tip.

2.1.3 MC 80 DX Microscope Camera with M 4 × 5” large-frame attachment

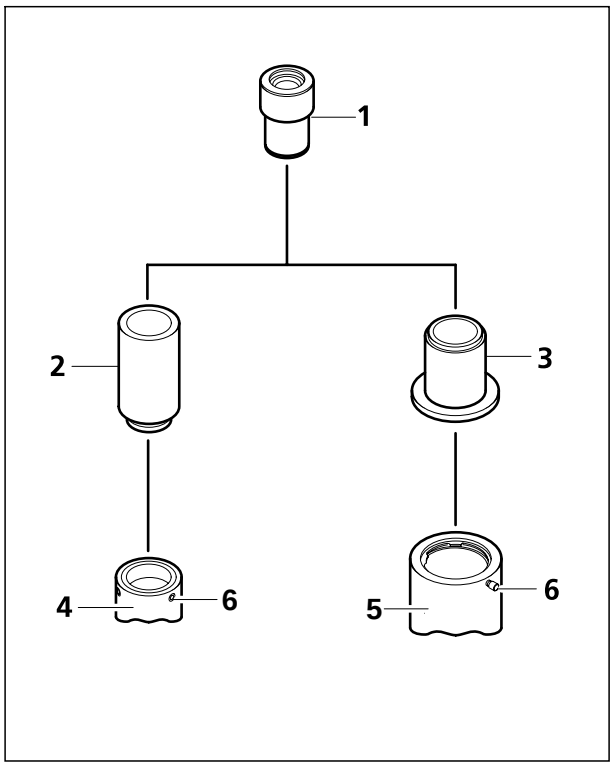


Fig. 2-4 Attaching the camera adapter and the projection lens

The equipment is designed to be installed by the user. Proceed as follows:

(1) Attaching the camera adapter

Insert camera adapter (2-4/**2**, **3**) for the MC 80 DX into the microscope's camera port (2-4/**4**, **5**) as far as it will go, and tighten setscrew (2-4/**6**) at the camera port. Mind the following assignment of adapters:

- Use the 44 mm image distance adapter (2-4/**3**) on camera ports with 44 mm image distance (2-4/**5**).
- Use the 60 mm image distance adapter (2-4/**2**) on camera ports with 60 mm image distance (2-4/**4**).

(2) Inserting the projection lens

Push the projection lens (2-4/**1**) into the top of the camera adapter, either the one for 44 mm image distance (2-4/**3**) or the one for 60 mm image distance (2-4/**2**).

(3) Attaching the MC 80 DX camera body

- Attach the MC 80 DX camera body (2-5/**5**) on to the camera adapter with inserted projection lens (2-5/**9**), with the body aligned so that the product name and company logo face you. Push body down as far as it will go. Lock by anticlockwise turning of the clamping ring (2-5/**8**).
- Push plug(2-5/**10**) of camera body into the socket labeled CAMERA BODY on the control console (see section 2.2).

(4) Attaching the M 4 × 5" large-frame camera attachment for MC 200 CHIP / MC 80 DX

- Attach M 4 × 5" large-frame camera attachment for MC 200 CHIP and MC 80 DX cameras (2-5/**1**) on top of camera body (2-5/**5**), pushing it as far as it will go. Mind the following:
  - No lens must be fitted in the camera attachment.
  - Red mark on thumbwheel (2-5/**2**) must face exactly frontward.
  - The guide pin (2-5/**4**) of the camera attachment must engage with the hole (2-5/**6**) of the camera body.
- To lock the attachment to the body, turn the thumbwheel (2-5/**2**) clockwise. This will move the locking lug (2-5/**3**) of the attachment into the slot (2-5/**7**) of the body.

(5) Inserting the eyepieces

Push the two focusing eyepieces (one without, the other with built-in frame size reticle) into the viewing ports of the trinocular tube as far as they will go. Align the eyepiece with frame size reticle so that the frame sides are aligned in parallel with the camera (see section 2.7).

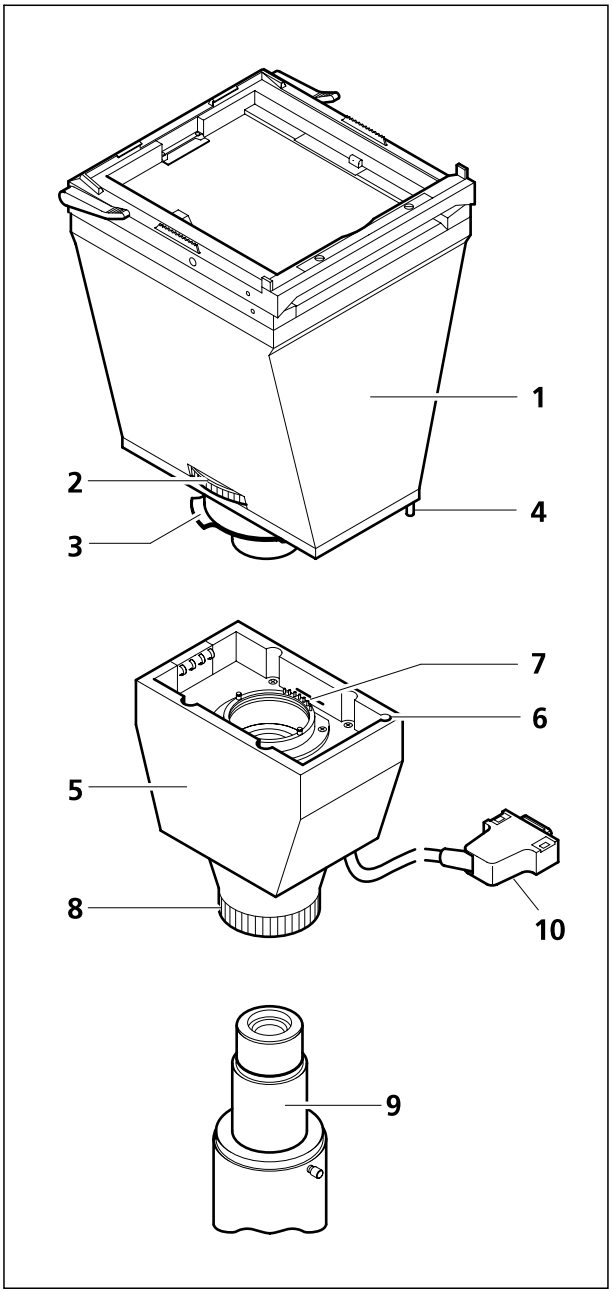


Fig. 2-5 **Attaching the camera body and the M 4 × 5" large-frame camera attachment**

2.2 Switches and Connectors

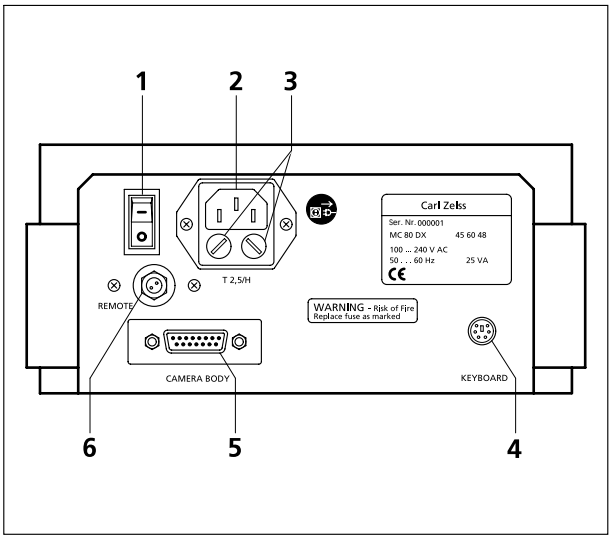


Fig. 2-6 Switches and connectors of the MC 80 DX control console (rear view)

(1) Connecting the camera body

- Push plug of camera body (2-2/**5**) or (2-5/**10**) into the CAMERA BODY socket (2-6/**5**). Tighten the two screws on the plug.

(2) Connecting a keyboard

- To the 6-point KEYBOARD socket (2-6/**4**) you can connect any IBM-MF keyboard that is compatible with AT & PS/2 systems and has a mini-DIN plug. Via an adapter for PS/2 systems you can also connect a keyboard with the somewhat bigger 5-point DIN plug.
- With a keyboard connected to the KEYBOARD socket, you can enter alphanumeric data to be exposed on the film (see section 2.6.2.5).

(3) Connecting a remote shutter release

- The 2-pole REMOTE socket (2-6/**6**) is intended for connecting a remote shutter release. An exposure will be released by establishing contact between the two poles.
- A plug with cable for connecting a remote shutter release can be ordered under catalogue no. 14 18 20.

(4) Connection to line power

- Connect the line power input socket (2-6/**2**) to a wall socket outlet via the cord supplied. The control console can be connected to line powers between 100 and 240 V.
- Power input is protected by two fuses (T 2.5 A / 250 V, with T standing for slow-blow. To change a fuse, screw out the respective fuse holder (2-6/**3**) (see section 3.2).

Before changing a fuse pull the line power plug!
After switching the control console off, wait at least 3 s before switching it on again.
When plugging the power cord, make sure that the control console is in switched-off state.

(5) Switching on the control console

To switch the control console on or off, actuate the power on/off switch (2-6/**1**).

- To switch on, press the switch half that is marked "I". The display windows will light up and indicate the current parameters in alphanumeric form (i.e. the initial state, or the parameters valid when the unit was last switched off).
- To switch off, press the switch half that is marked "O". The display will go out; the micrographic parameters current at the moment of switch-off will be saved for about 20 days.

2.3 The Control Console of the MC 80 DX Microscope Camera

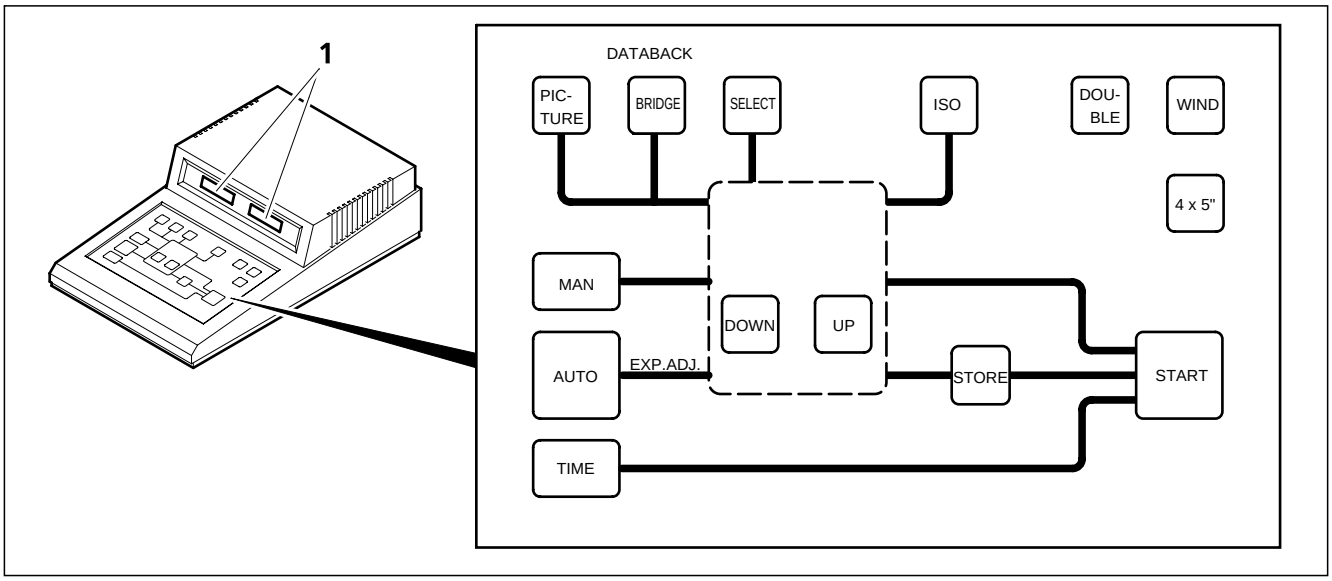


Fig. 2-7 MC 80 DX control console

- Turn on the control console with the power on/off switch (2-6/**1**) at the rear of the unit.
- On the display panel, two backlit LCD display windows (2-7/**1**) will light up. They indicate the unit's initial state: AUTO exposure mode, exposure correction for the PH/DIC 0 method and the data formats and their contents that were active when the console was switched off last.

2.3.1 Exposure control for 35 mm frames

When you use 35 mm film, the windows display the following information:

- Left window:
  - AUTO - MAN - TIME exposure mode with the exposure time.
  - Method-specific exposure correction in AUTO mode.
- Right window:
  - Parameters of data exposure for two data fields, if you use the 35 mm Mot DX film cassette with D4 databack (see section 2.6).

2.3.2 Shutter release

START

- In the AUTO and MAN(ual) modes: Press the <START> button to release the shutter. At the end of the automatically or manually selected exposure time, the shutter closes automatically. In case of 35 mm film this is followed by automatic data exposure and power film advance by one frame (except if you have activated multiple exposure).

START

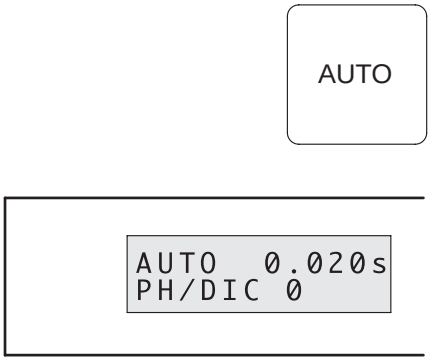
- In the TIME mode: Press the <START> button to open the shutter. Press again to close it. In case of 35 mm film this is followed by automatic data exposure and power film advance by one frame (except if you have activated multiple exposure).

Shutter release is blocked in the following conditions:

- No film in the camera.
- Film has advanced to its end.
- Film is just being advanced or rewound.
- 35 mm Mot DX film cassette not attached.
- M 4 × 5” camera attachment attached, but <4 × 5”> button not yet pressed.
- Too much light (OVER).
- Data input mode for the D4 databack is active.

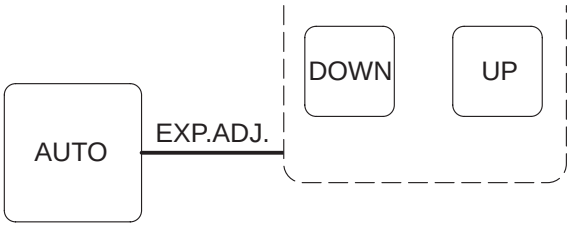
2.3.3 AUTO mode (Automatic exposure control)

Pressing the <AUTO> button activates automatic exposure control. The exposure time shown by the LCD display is determined by the existing light intensity, the film speed, the method-specific exposure correction, and the camera factor. During the exposure, the time indication is running back to zero.



2.3.3.1 Exposure correction in AUTO mode

Use the <UP> ad <DOWN> buttons to enter the desired exposure correction for the microscopy method used, in whole increments. For easier input, the LCD display indicates the methods and the correction values assigned to them.



2.3.3.2 Common settings for method-specific corrections

- For brightfield (Dark features on a bright background) BF +1
- For phase or interference contrast PH/DIC 0
- For darkfield/fluorescence (Bright features on a dark background) DF/FL -2

Depending on the type and size of the features seen before the background it may be necessary to deviate from the above settings in favor of these:

- For brightfield
  Few, or very small, dark features on large expanse of bright background BF +2
  or
- For darkfield / fluorescence
  Few, or very small, features on large expanse of dark background DF/FL -3

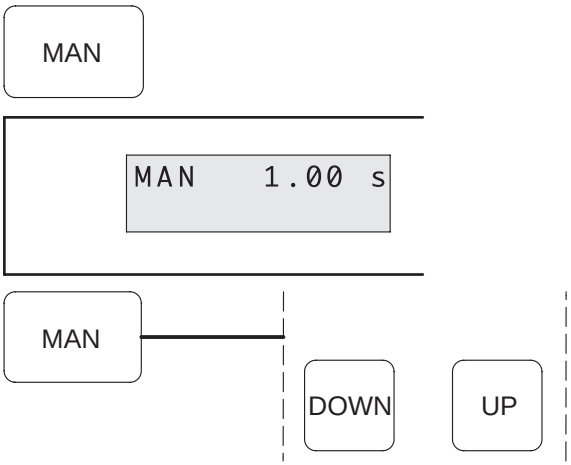
The following multiplying factors apply to the selected exposure corrections:

Exposure correction	**Multiplying factor**
BF +2	Factor 4×
BF +1	Factor 2×
PH/DIC 0	Factor 1×
DF/FL -1	Factor 0.5×
DF/FL -2	Factor 0.25×
DF/FL -3	Factor 0.125×

Example:

BF +1 means that an exposure with brightfield (BF=Brightfield) is longer by one exposure increment (+1) than that recommended by the automatic system (i.e. exposure time is doubled, the negative gets darker, while transparencies and Polaroid pictures get brighter).

2.3.4 MAN mode (Manual exposure control)



- Pressing the <MAN> button activates exposure control by a manually entered exposure time.
- The manually entered exposure time is indicated on the LCD display.
- During the exposure, the time indication is running back to zero.
- Starting from the basic setting of 1 s, the exposure time can be expanded or reduced by whole increments by repeatedly pressing the <UP> or <DOWN> button, respectively.
  - Keep <UP> or <DOWN> depressed for a fast browsing of exposure times.
  - Shortest exposure time: 0.008 s = 1/125 s
  - Longest exposure time: 4000 s

2.3.5 TIME mode (long-time exposure control)

- Pressing the <TIME> button activates (long) TIME exposure control. Press the <START> button to open the shutter (start exposure). Press <START> again to close the shutter (end exposure).

- During the exposure, the time is counted upwards in steps of 1 s. After completion of the exposure, the display shows the time for which the shutter was open.

- The longest possible exposure time is 9999 s. When this time is over, the exposure is automatically stopped.

2.3.6 Saving the exposure time

- If you press the <STORE> button, the exposure time determined in the AUTO mode is kept constant for any number of exposures, until you press <STORE> again to cancel the saving function.

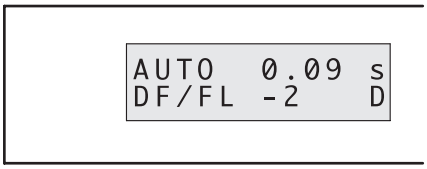
- The active state of the saving function is indicated on the LCD display by the comment "STORE" instead of "AUTO".

- This function can be used for the following purposes:
  - Capturing larger specimen areas by a series of exposures (excludes the influence of different area coverages by the specimen detail on exposure time).
  - Making visible differing light intensities in multiple fluorescence work.

2.3.7 Multiple exposure

DOU-
BLE

- Multiple exposure is only possible with 35 mm film. To activate the multiple exposure mode, press the <DOUBLE> button.



- Pressing the <DOUBLE> button causes the letter "D" to appear at the last digit of the bottom line of the left display window.
- The first exposure released with the <START> button is not followed by data exposure nor by power film advance. The letter “D” blinks. Only after the second exposure released with the <START> button will data exposure and power film advance by one frame take place.
- You can release more than two exposures on the same frame, if you release the next exposure by pressing the <DOUBLE> button instead of <START>, while "D" is blinking. Pressing the <DOUBLE> button stops the blinking; the "D" symbol now is steady.
- This can be repeated any number of times. To end the sequence, release an exposure by pressing the <START> button while "D" is blinking. This last exposure is followed by data exposure and film advance by one frame.
- The function can be used for the following purposes:
  - Taking the same specimen detail with different illumination methods or fluorescence filters.
  - Overlay exposures of scales, marks or micrometer nets.
- As the individual exposures add up in density, at least in places, each exposure should perhaps be reduced in time, say, by one exposure increment (-1).
- To cancel the multiple exposure mode, take one of the following actions:
  - Press the <DOUBLE> button again before releasing the first double/multiple exposure.

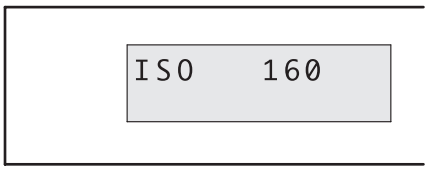
    or
  - Press the <WIND> button to effect film advance (after an exposure made while "D" was on).

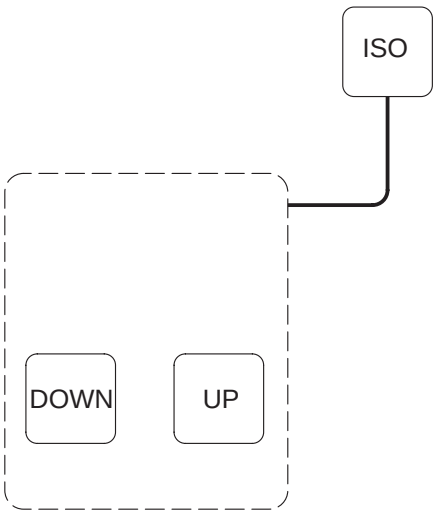
2.3.8 Exposure interruption / Film advance

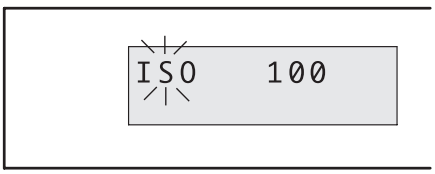
- Pressing the <WIND> button stops any running exposure. In case of 35 mm film, this is followed immediately by film advance, while data exposure is skipped.
- Pressing the <WIND> button stops the multiple exposure mode after an exposure made while the "D" symbol was on. This is followed immediately by film advance, while data exposure is skipped.
- Pressing the <WIND> button advances a 35 mm film by one frame even if no exposure has been made on the present frame. The empty frame can be used to separate, e.g., two series of exposures.

2.3.9 Display or input of film speed

- Press the <ISO> button to have the current film speed indicated or to enable film speed input.
- Display of current film speed:
  - Briefly press the <ISO> button to see the current film speed displayed for 3 s instead of the exposure mode, exposure time and exposure correction display.
  - In case of large-frame micrography, film speed is constantly indicated elsewhere (see section 2.4).







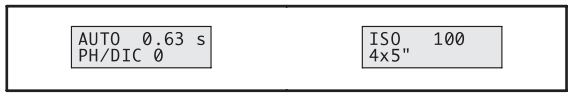
- Input of the speed of non-DX-coded 35 mm filmand of large-frame sheet film:
  - Press <ISO> button for about 1.5 s until the film speed display shows the blinking "ISO" symbol.
  - As long as "ISO" is blinking, you can use the <UP> and <DOWN> buttons to increase or decrease film speed by steps of 1/3.
  - Keep <UP> or <DOWN> depressed to browse through the film speed range.
  - Minimum rating: ISO 25
  - Maximum rating: ISO 12500
  - After about 3 s, the "ISO" symbol of the film speed display stops blinking. This means that the current ISO rating has been confirmed.
  - In case of 35 mm film, the display returns to the indication of exposure mode, exposure time and method-specific exposure correction. In case of large-frame micrography, the new speed setting appears on the constant film speed display.

2.4 Exposure Control for Large Frames

- With the M 4 × 5” camera attachment installed, pressing the <4 × 5”> button converts the exposure control for large-frame micrography and disables the “FILM END” warning.

The MC 80 DX does not automatically recognize the M 4 × 5” camera attachment. If the “FILM END” warning is still on after you have installed the attachment, press the <4 × 5”> button again.

For 4 × 5” micrography, the display windows indicate the following:



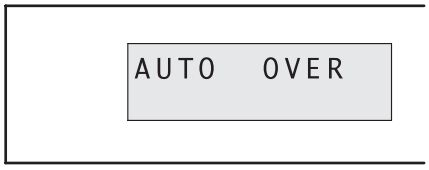
- Left window:
  - AUTO - MAN - TIME exposure mode and exposure time.
  - Method-specific exposure correction (in AUTO mode).
- Right window:
  - ISO film speed rating.
  - 4 × 5” frame size.

- The procedure for large-frame (4 × 5”) micrography is the same as that described in section 2.3, except that no multiple exposure is possible.
- When you attach a 35 mm film cassette, the large-frame mode automatically changes into the 35 mm mode.

2.5 Warning Messages

In the **AUTO mode**, the following warning messages may appear on the LCD display:

- **AUTO OVER** - Image is too bright, i.e. beyond the upper limit of the MC 80 DX measuring range.

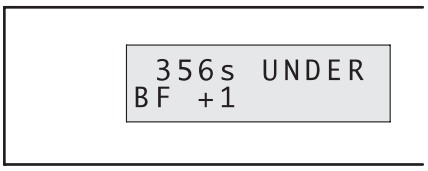


– No exposure can be released by pressing the <START> button (the same applies in case of the "STORE OVER" warning).

Remedy:

– Use gray filter in illuminating beam path.

- **UNDER** - Image light is missing or insufficient, i.e. below the lower limit of the MC 80 DX measuring range.



– Nevertheless, an exposure with the exposure time indicated before the "UNDER" warning can be released by pressing the <START> button, although this may result in an underexposed micrograph.

– If the "UNDER" warning appears without indication of any exposure time, no exposure can be released by pressing the <STAR

Remedies:

– Check whether the illuminating beam path is free or blocked.
– Select MAN(ual) mode.

The following warning message can appear in **any mode**:

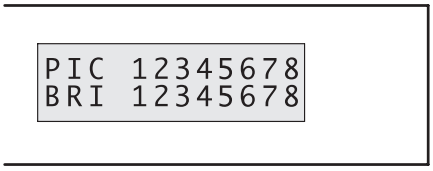
- **FILM END** - Indicates one of several conditions:

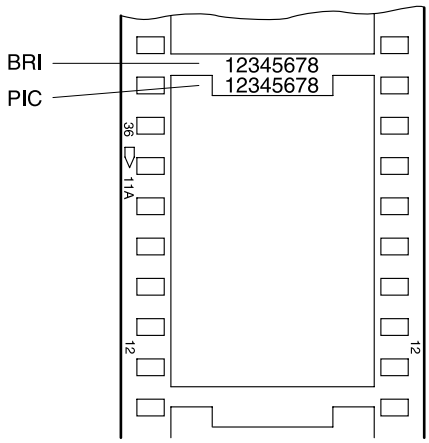
– No film loaded in 35 mm Mot DX film cassette.
– Film is at its end.
– Film is being advanced or rewound.
– 35 mm Mot DX cassette not installed.
– M 4 × 5" camera attachment installed, but <4 × 5"> button not pressed yet.

Remedies:

– Load in 35 mm Mot DX film cassette.
– Check whether 35 mm Mot DX film cassette is installed.
– If M 4 × 5" camera attachment is installed, press the <4 × 5"> button.

2.6 Data Exposure via Control Console (for 35 mm frames only)





- If the D4 databack is installed on the 35 mm Mot DX film cassette, data can be exposed either on the margin of the shorter side of the frame (= **PIC** data field) or on the space ("bridge") between two successive frames (= **BRI** data field). The data in either the PIC or BRI data field consist of one line of 8 alphanumeric characters.
- The data can be entered via the control console or a keyboard connected to it. The data entered remain stored for about 20 days after the control console has been switched off.

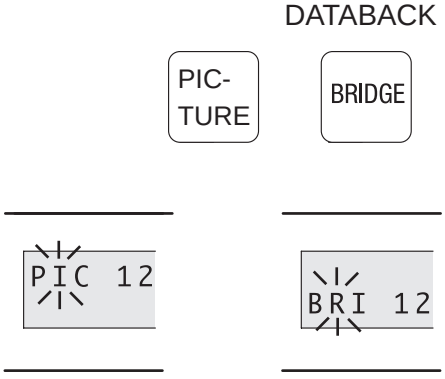
If you change between several 35 mm Mot DX film cassettes with D4 databack:

  - The data entered for a film cassette installed remain valid for a new film cassette installed in its place.
  - After changing the film cassette, enter new data if necessary.

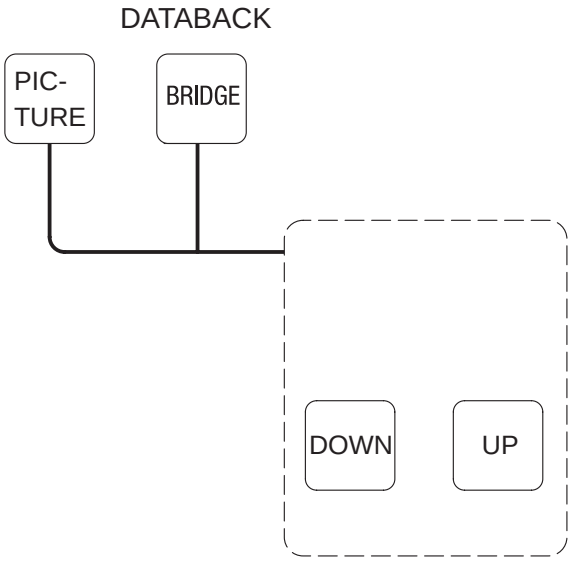
- If you use a 35 mm Mot DX film cassette without D4 databack, the PIC and BRI data fields are not displayed.

2.6.1 Selecting the data field

- Press the <PICTURE> or <BRIDGE> button to activate the respective data field in which you want to select a data format and enter the necessary data. On the LCD display, the symbol of the selected data field blinks for about 3 s.



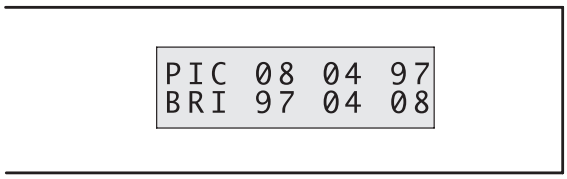
2.6.2 Selecting the data format



- While the symbol of the selected data field, “PIC” or “BRI”, is blinking, the data formats described below can be selected in succession by pressing the <UP> or <DOWN> button.

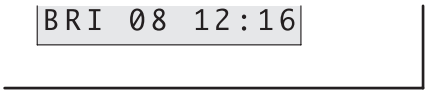
- During data format selection you cannot release an exposure.
- Conclude the selection of a data format by pressing the <PICTURE> or <BRIDGE> button again.
- The “PIC” or “BRI” symbols will then stop blinking.

2.6.2.1 Data format DMY (day - month - year) / YMD (year - month - day)



- Example:
  The date 8th April 1997 appears as “08 04 97” or "97 04 08”, respectively.

2.6.2.2 Data format DHM (day - hour - minute)



- Hours are shown and exposed in the 24-hour notation.
- Example:
  The 8th day of a month, 16 minutes past 12 (noon) appears as “08 12:16”.

2.6.2.3 Data format F-Count (frame counter)

- This data format is coupled to film advance. Every film advance increases the frame count displayed by 1. Frame counts that can be exposed range from “01” to “99”.
  - Example:
    Frame no. 32 of the film appears as “32”.

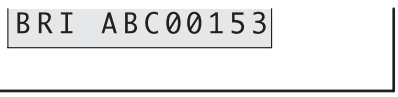
- Upon installation of a 35 mm Mot DX film cassette with newly loaded film, the film leader is automatically wound to frame number “01”.
- When changing 35 mm Mot DX film cassettes:
  - Assuming you remove a film cassette at a frame count of, e.g., "08" and replace it with another cassette previously used up, e.g., to frame "24”.

  - The frame counter will still show and expose “08”!
  - You need to enter the current frame count of the newly installed film cassette.

The frame count will increase by 1 with every film advance even if you are exposing a different data format in between, or if the data field is in OFF state.

2.6.2.4 Data format S-Count (Special counter)

- This data format allows you to expose letters or signs on the first 3 digits and numerals on the following 5 digits. The 5-digit number is coupled to film feed; it counts on with every film advance, starting with the last digit.
- Characters that can be exposed:
  - Letters from “A” to “Z”, or signs + - * / .
  - Frame numbers from “00000” to “99999”.
- The frame counter will retain the current reading even after loading a new film and winding the leader to the first frame, as well as after changing the 35 mm Mot DX film cassette.
- This way it is possible, e.g., to provide test series exposures with a common identifier and a continuous count number.
  - Example: Exposure no. 153 of test series ABC appears as “ABC00153”.



The frame count will increase by 1 with every film advance even if you are exposing a different data format in between, or if the data field is in OFF state.

2.6.2.5 Data exposure via keyboard

The data for the **Keyboard** and **Keyboard-Scale** formats cannot be entered via the control console.

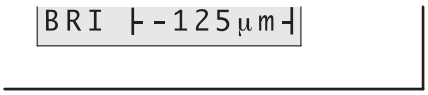
Data input for these formats is through an external keyboard (UK English type), which connects to the socket marked "Keyboard" at the rear of the control console via a Mini-DIN connector.

- The following characters can be entered through the keyboard:
  - Letters: **a - z** and **A - Z**
  - Numerals: **0 - 9**
  - Signs: **- + _ * = [ ] ; , . / ! @ ? $ % & ( ) { } : " < > ? ' # |**
- The various digits can be selected, corrected, deleted or confirmed with the keyboard's control keys: **Space bar**, **Cursor** ←, **Cursor** →, **Backspace** ←, **Enter** ↵ and **Delete**.
- Conclude selection of the data format by pressing again the <PICTURE> or <BRIDGE> button on the exposure control console. The "PIC" or "BRI" symbol, respectively, in the display window will then stop blinking.

(1) Keyboard data format

- Each of the 8 digits of this data format can individually be occupied by alphanumeric, grammatical or mathematical characters/signs, or spaces.
  - Example:
    A test specimen may be marked "TEST - 3/9".

(2) Keyboard-Scale data format



- This data format is intended for the exposure of a scaling bar. The digits 1, 6, 7 and 8 of the data exposure field are occupied by the left and right limits of the scaling bar and the "µm" unit (see the illustration). At the 4 digits in between you can enter the length L covered by the scaling bar in the specimen plane. The first free digits can be filled with "-" or "0" characters if the length value only comprises 2 or 3 digits.

- Before, the length L in the specimen plane must be computed by the formula given below, for the respective objective magnification and intermediate magnification. This formula already allows for the length of the scaling bar in the 35 mm format (12.5 mm) and for the projection lens factor (2.5×).

$$L = \frac{5000}{V_{obj} \times V_z} (\mu m)$$

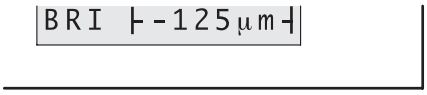
V_{obj} = objective magnification

V_z = intermediate magnification (Optovar or zoom factor)

Example:
$V_{obj} = 40\times$; $V_z = 1\times$

$$L = \frac{5000}{40 \times 1} = 125\ \mu m$$

- The length of the scaling bar in the specimen plane is 125 µm. It can be entered as shown in the illustrations below:
  - either



  - or

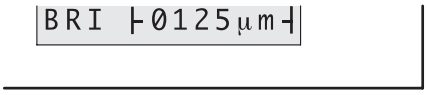
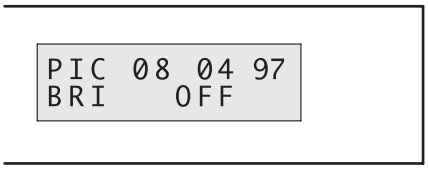


Table: Length L (µm) of the scaling bar in the specimen plane depending on the objective magnification V_{obj} and the intermediate magnifaction V_z

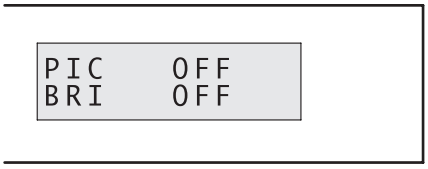
V_{obj}	V_z				
	1 ×	1,25 ×	1,6 ×	2 ×	2,5 ×
1,25 ×	4000 µm	3200 µm	2500 µm	2000 µm	1600 µm
2,5 ×	2000 µm	1600 µm	1250 µm	1000 µm	800 µm
4 ×	1250 µm	1000 µm	781 µm	625 µm	500 µm
5 ×	1000 µm	800 µm	625 µm	500 µm	400 µm
10 ×	500 µm	400 µm	313 µm	250 µm	200 µm
20 ×	250 µm	200 µm	156 µm	125 µm	100 µm
25 ×	200 µm	160 µm	125 µm	100 µm	80 µm
32 ×	156 µm	125 µm	98 µm	78 µm	63 µm
40 ×	125 µm	100 µm	78 µm	63 µm	50 µm
50 ×	100 µm	80 µm	63 µm	50 µm	40 µm
63 ×	79 µm	63 µm	50 µm	40 µm	32 µm
100 ×	50 µm	40 µm	31 µm	25 µm	20 µm
150 ×	33 µm	27 µm	21 µm	17 µm	13 µm

2.6.2.6 OFF state

- In this state, the data field displaying the "OFF" message does not contain any data.



- One data field containing data, the other one being in "OFF" state:
  - A data strip in "OFF" state may still show on the film by its faintly lit background and the darker rectangles of the 8 matrix elements (see section 2.8.3).



- If the "OFF" message appears on both data fields, data exposure is disabled.

2.6.3 Data input in the selected format

During data input, the "BRI" or "PIC" symbol for the respective data field is blinking.

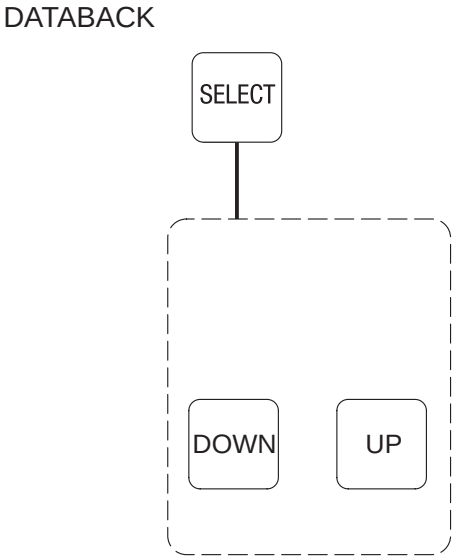
During data input, no micrograph can be exposed.

2.6.3.1 In the data formats DMY, YMD, DHM, F-Count and S-Count

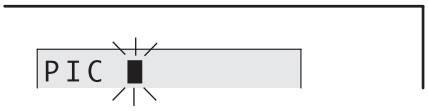
- Use the <SELECT> button to select the digit. The selected digit is marked by the blinking cursor below it.

- Upon the first pressing of the <SELECT> button, the blinking cursor marks the first digit. (The "BRI" or "PIC" symbol of the selected data field stops blinking).

- Use the <UP> and <DOWN> buttons to select the numeral, letter or sign you want to enter at this digit.
- Select the digits in forward succession. If you find that you made an error at a previous digit, you cannot go back to it, but have to repeat the input procedure from the beginning.
- To conclude data input, press the <SELECT> button repeatedly until the cursor has vanished from the data field.



2.6.3.2 In the Keyboard and Keyboard-Scale data formats



- Pressing the <SELECT> button enables data input through the keyboard.
- In the respective data format, the first digit and its value (with cursor) blink alternatingly at a clock rate of 1 second.
- Now you can enter the data via the keyboard digit by digit. The respective input position is indicated by blinking of the digit and the cursor.

- Date input via the keyboard can be terminated at any digit by pressing the <Enter> (↵) key (on the keyboard) or the <SELECT> button (on the control console).

2.6.3.3 Examples of data input

(1) Time updating in the BRI data field with data format DHM

- From 08:13 to 13:30 for the 10th day of a month on the control console.
- Make entries for data formats DMY, YMD, F-Count and S-Count correspondingly.

Select	Press button	Display
BRI data field	BRIDGE	BRI 10 08:13
1st hour digit (H)	3x SELECT	BRI 10 08:13
Desired setting: 1	1x UP	BRI 10 18:13
2nd hour digit (H)	1x SELECT	BRI 10 18:13
Desired setting: 3	5x DOWN	BRI 10 13:13
1st minute digit (M)	1x SELECT	BRI 10 13:13
Desired setting: 3	2x UP	BRI 10 13:33
2nd minute digit (M):	1x SELECT	BRI 10 13:33
Desired setting: 0	3x DOWN	BRI 10 13:30
End of input	1x SELECT	BRI 10 13:30

(2) Input of scaling bar in the PIC data field with Keyboard-Scale data format

- Enter the length of the scaling bar: 125 µm (overwrite an existing reading of 4000 µm).
- Make entry for the Keyboard data format correspondingly.

Select	Press button	Display
	on control console:	
PIC data field	1x PIC	PIC OFF
Keyb.-Scale data format	1x DOWN	PIC ⊢4000µm⊣
1st free digit	1x SELECT	PIC ⊢4000µm⊣
	on keyboard:	
Character: -	-	PIC ⊢-000µm⊣
Character: 1	1	PIC ⊢-100µm⊣
Character: 2	2	PIC ⊢-120µm⊣
Character: 5	5	PIC ⊢-125µm⊣
Enter (↵)	↵ Enter	PIC ⊢-125µm⊣

2.6.4 Location of the PIC data field

The location of the PIC data field inside the micrograph is not marked on the various MC 2.5× frame size reticles.

With reference to the image of the reticle seen in the eyepieces of the trinocular tube, the data field is located at the left frame margin (with manufacturer's logo and product name "MC 80 DX" on the camera body facing the operator).

2.7 Frame size reticles

- The frame size reticle indicates the boundaries of the image area captured by the 35 mm Mot DX film cassette (2-8/**1**).
- The double-line cross mark (2-8/**2**) at the center is intended for checking the focusing. It must be seen in focus together with the specimen image.
- The frame size reticle comes factory-mounted in one of the focusing eyepieces.
- Insert the eyepiece containing the reticle into one of the eyepiece sleeves of the trinocular tube, and align the reticle with the camera (camera front facing the operator).
- Fig. 2-8 shows, within the 35 mm frame corners (2-8/**1**), the locations of the non-marked frame boundaries for 4 × 5" (2-8/**3**) and 9 × 12 cm (2-8/**4**) film sheets.

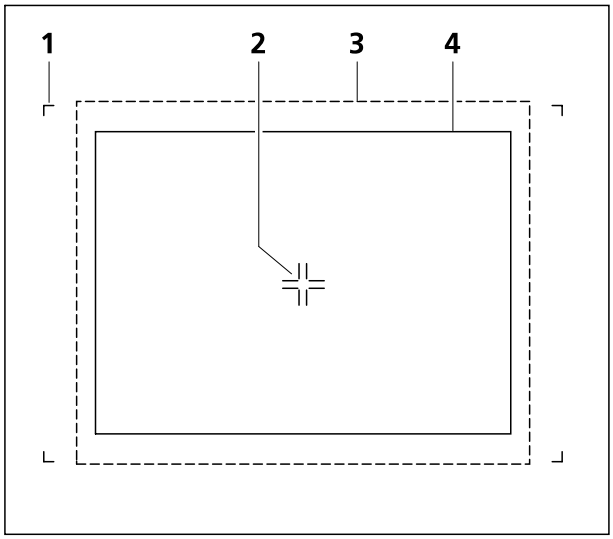


Fig. 2-8 MC 2.5× frame size reticle

Frame size reticle	in eyepiece	of microscope
MC 2.5× /dia. 26 mm 454075-0000-000	PL 10×/18 Br. foc. E-PL 10×/20 Br. foc. E-PL 10×/23 Br. foc. W-PL 10×/23 Br. foc. PL 10×/25 Br. foc. E-PL 10×/25 Br. foc.	Standard 25 ICS Axiolab Axioskop, Axioskop 20, Axioskop 2 Axioplan, Axioplan 2 Axiotron, Axiotron 2 Axiotech Axiovert S 100/135 Stemi DRC Stemi SV 6, Stemi SV 11 Stemi 2000-C/CS
MC 2.5× /dia. 21 mm 454025-0000-000	Kpl 10×/20 Br. foc.	Standard 20/25
MC 2.5× /dia. 19 mm 476021-0000-000	KF 10×/18 Br. foc. Kpl 10×/18 Br. foc.	Standard 20/25

2.8 Photomicrography Procedures

2.8.1 Taking micrographs

- Carefully set and focus the microscope for observation. Preferably select beam splitting for simultaneous observation and micrography.
- Select illuminating method, objective magnification and condenser setting as usual.
- For micrography, set brightness to a color temperature of 3200 K.
- Load film cassette with film and install it on MC 80 DX camera body.
  - If you use DX-coded No. 135 (35 mm) film cartridges, the ISO film speed rating is sensed automatically.
  - If you use non-DX-coded No. 135 (35 mm) film cartridges or 4 × 5" large-frame film, you need to enter the ISO rating manually.
- Select the exposure correction for the illumination method employed.
- For data exposure: Select the desired data format and enter data.

The display windows of the MC 80 DX control console now indicate the exposure mode, the exposure time, the exposure correction and the data to be exposed.

If you use the 4 × 5" camera attachment, the right display window of course does not show any data to be exposed, but the ISO film speed rating and the frame size (4 × 5") instead.

- Carefully select the specimen area of interest and focus on it. If the focusing crosshairs and the specimen are in focus at the same time, the image on the film will also be in focus. If necessary, focus the eyepieces for your individual eyesight. In order to obtain correct focusing with low-power objectives, we recommend the use of the 3x12B monocular prism glass, focused at infinity, as a focusing aid.
- To release an exposure, press the <START> button.

This starts the following automatic actions in succession:

- Current-situation exposure metering
- Exposure of the micrograph
- Data exposure
- Film advance

Then the next exposure can be released.

2.8.1.1 Film selection

For color micrography, use color reversal (slide) film. In general, indoor (artificial-light) film for 3200 K is recommended. For daylight film you need to use a 3200/5500 conversion filter.

Films designated "Professional" have closer tolerances of speed and color balance, thus rendering micrographs of greater consistence in exposure and color rendition. DX-coded films should always be used in the original cartridges.

2.8.1.2 Use of bulk film

We advise you not to use bulk film, as it may be degraded by light entry, scratches, dust etc., which will deteriorate your micrographs; moreover, defective cartridges may cause film winding problems.

If you cannot help using bulk film, at least mind the following advice:

Only use film cartridges conforming to DIN 4335 or ISO 1007-1977 standard specifications. Be certain not to use cartridges greater than the maximum dimensions specified in these standards.

Film cartridges are unfit for long-time use! Discard them after a maximum of 10 loads.

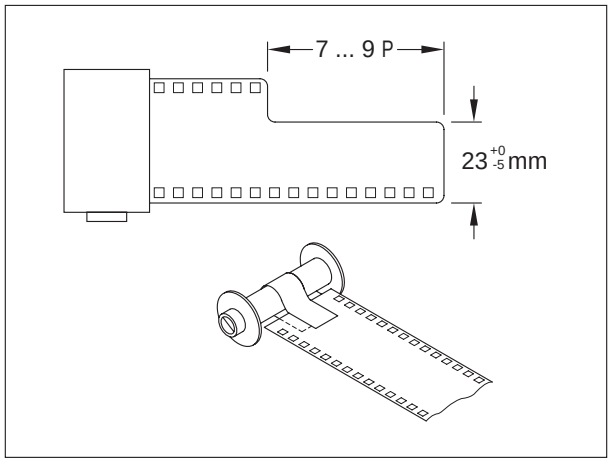


Fig. 2-9 Cutting the tongue of bulk film

Cut the film tongue always as specified in DIN 4536 or ISO 1977 (Fig. 2-9).

- The cut must not run across any sprocket hole.
- Cut the tongue parallel to the film edge, over a length of 7 - 9 sprocket holes.
- Round the corners to ensure that the film does not get caught at the cartridge lip or parts of the cassette.
- Cut the film end at right angles with the long edges, and fix it securely to the reel with a piece of adhesive tape (Scotch tape, Sellotape or the like).
- Avoid using great lengths of film, as some cartridges are not suitable for 36 frames or for every type of film. Otherwise you risk damage to the film advance mechanism in the cassette.

2.8.2 Correcting the color balance of color reversal film

The color balance of one and the same make and type of color reversal film may differ from batch to batch. These differences can be compensated with commercial color compensating (CC) filters.

The filter density is designated by a two-digit number, and the color by the first letter of the color name.

Examples: 05 - B (Blue), 10 - G (Green), 20 - R (Red)

2.8.2.1 Checking the color balance

- Make test exposures of a specimen area including as much empty background as possible, using brightfield transmitted-light illumination.
- View the color transparencies on a light box equipped with a standard illuminant having the correct illumination level and a spectral power of 5000 K.
- The empty background in an exposure series should range from neutral dark gray via medium gray and light gray to white.

2.8.2.2 Correcting the color balance

- Place a CC filter of the color complementary to the color bias on the transparency to be corrected.

Color bias	**Color of the CC filter**
Blue	Yellow Y
Green	Magenta M
Red	Cyan C
Yellow	Blue B
Magenta	Green G
Cyan (bluish green)	Red R

If, for example, a filter of density 10 produces the required color balance on viewing, you should use a CC filter of half the density for the following exposures, i.e. 05 in this case. Filters of densities CC - 05 to CC - 10 are usually sufficient for correction.

Perfectly corrected color exposures require identical microscope settings, film processing conditions and film batches .

2.8.3 Data exposure on 35 mm film

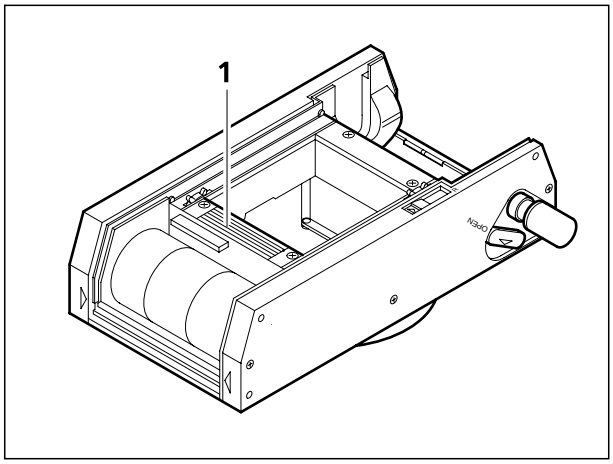


Fig. 2-10 35 mm Mot DX film cassette

On bright specimen areas, the data exposed on the frame may sometimes be barely legible. We recommend you to slide the data mask (2-10/**1**) arranged on the film gate into the image window as far as it will go. This mask obscures a field of 2.5 mm x by 14 mm on the frame margin from exposure to the microscope image rays, thus providing a background on which the data are clearly legible. The data mask can only be slid in or out before the film is inserted - it is no longer possible once the film cassette has been loaded!

When you cut frames off the processed film (e.g. to make slides), or when you duplicate micrographs, mind that data exposed on the space between frames (BRI data field) will be lost. Therefore, use the BRI data field only for data that also can be recorded separately later (e.g. on slide

mounts, or picture file cards).

Important data characterizing a micrograph (e.g. the scaling bar) belongs in the PIC data field inside the frame!

Data exposure is automatically adapted to the film's ISO rating.

As the data is exposed from the rear of the film (through the protective coating and film base), data exposures on films of equal speed but different make and type may differ in brightness.

2.8.4 Darkfield and fluorescence micrography

Compared with common (brightfield) micrography, the following special conditions apply to darkfield and fluorescence work:

- The low brightness level frequently encountered calls for long exposure times. With low light, switch the beam splitter on the trinocular tube so as to send 100% of the light to the camera port.
- Fluorescence is neither daylight nor artificial light, but is generated inside the specimen. Usually, daylight film renders better fluorescence micrographs than indoor film.
- Be not afraid to use fast film. Grain is hardly ever a problem in fluorescence pictures.
- Frequently, the dark or even black background accounts for a substantial part of the area used for automatic exposure metering. Estimate the ratio of bright and dark areas, and correct the exposure time accordingly.
- Because of the high contrast, the exposure latitude is fairly great, because luminous features are well set off against a dark background in a wide range of different exposures. If your application requires an exact rendition of fluorescence colors, however, is it recommended to make a series of exposures with different exposure times.
- Some fluorescence dyes will bleach out quickly, especially under strong, high-energy excitation light. To preserve the specimen, use the aperture diaphragm to reduce the excitation intensity, at least for part of the time.

Weak fluorescence can be discerned easier in a dark room.

2.8.5 Exposure times and filters

The "UNDER" warning (see section 2.5) appears in case of 35 mm film and "PH/DIC 0" exposure correction, if the following exposure times are exceeded:

Film speed	**Exposure time**
25 ISO	1024 s
100 ISO	252 s
400 ISO	63 s
1600 ISO	16 s
6400 ISO	4 s

The following filters are available for photomicrography:

Filter	**32 mm dia.**	**25 mm dia.**	**18 mm dia.**
Gray filter 0.50 (50 % transmittance)	467840		
Gray filter 0.12 (12 % transmittance)	467841		
Gray filter 0.03 (3 % transmittance)	467842		
Neutral filter 0.25 (25 % transmittance)		447836	467856
Neutral filter 0.06 (6 % transmittance)		447835	467855
Conversion filter 3200-5500 K	467847	447825	467854
Blue filter CB 6	467851		
Blue filter CB 3	467852		
Interference green filter	467803	447805-9901	

CARE AND MAINTENANCE

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3 CARE AND MAINTENANCE

3.1 Care

The MC 80 DX Microscope Camera requires no care beyond the following precautions and actions:

- Always protect the camera from dust and moisture.
- Always put the dust cover on the camera after use.
- Remove dust from optical surfaces with a soft natural hair brush or a rubber blowbulb.
- Remove persistent dirt or fingerprints with commercial optical cleaning cloth or eyeglass tissue.
- Never leave the camera exposed to harmful environmental conditions (air humidity, temperature) for long.
- For relocating the MC 80 DX on your premises, secure all moving parts, or carry them separately.
- Secure the camera against toppling over and avoid hard shocks.

3.2 Fuses

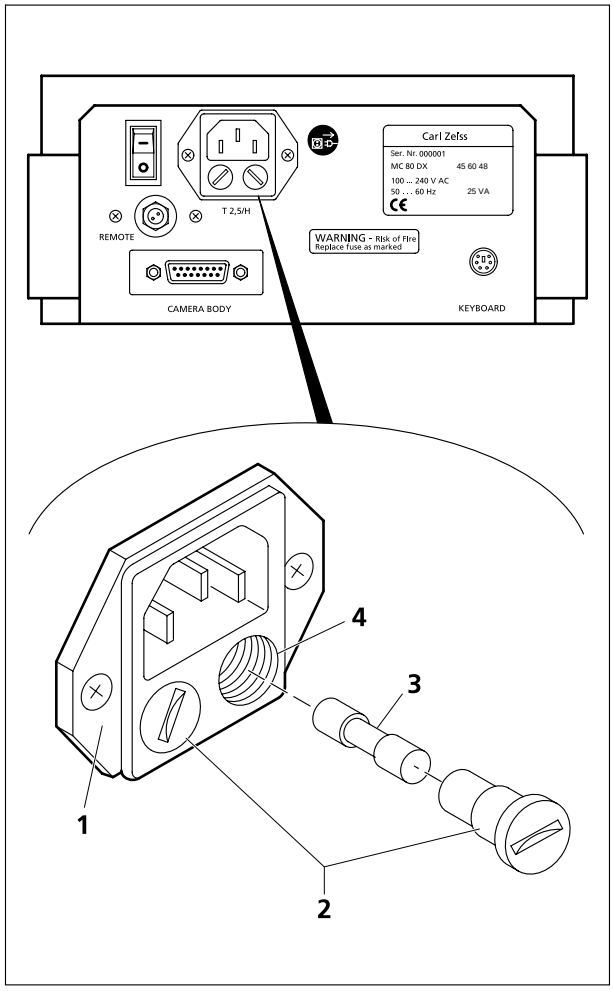

Fig. 3-1 Changing a fuse

The two fuse holders (3-1/**2**) are inside the power input socket/fuse combination (3-1/**1**) at the rear of the control console.

Each fuse holder contains a T 2.5 A/250 V fuse (3-1/**3**), which operates with all line voltages in a range of 100 to 240 V AC. The letter T designates a slow-blow fuse.

Changing a fuse

- Pull plug of line power cord.
- Use a coin to unscrew the fuse holders (3-1/**2**) and pull the fuse holders out of the receptacles (3-1/**4**) .
- Take fuses out of fuse holders (3-1/**2**) and check which is blown. Replace the blown fuse.
- Put fuse holders back into the receptacles (3-1/**4**) and screw them tight with a coin, pressing against the spring action of the holders.

3.3 Line Power Conversion

The MC 80 DX control console is designed to operate at any a.c. line voltage between 100 and 240 V and at line frequencies of 50 to 60 Hz.

Therefore, no conversion is needed on the unit to adapt it to any of these line powers.

3.4 Requesting Service

All repairs of mechanical, optical or electronic components inside the instrument and of the electrical components of the MC 80 DX may only be performed by Carl Zeiss service staff or specially **authorized** personnel.

To ensure the optimum setting and trouble-free function of your microscope even for a longer period of time, we would recommend you to conclude a service/maintenance contract with Carl Zeiss.

In the case of subsequent orders or when service is required, please get in touch with the Carl Zeiss Microscopy Service in Germany or your local Carl Zeiss agency.

The Carl Zeiss Microscopy Service within Germany can be reached at the following addresses:

Telephone: 0180 333 6333 (only available within Germany)
Fax: ++49-73 64 20 4939
e-mail: me-sd@zeiss.de

Further information is available under the following Internet address:

micro@zeiss.de

www.zeiss.de/micro

ANNEX

- List of Acronyms and Abbreviations
- Subject Index
- Certification acc. to DIN ISO 9001 / EN 46001
- Declaration of EU Conformity

List of Acronyms and Abbreviations

BF	Brightfield
Br.	High eyepoint eyepiece (for eyeglass wearers)
BRI	Bridge (data strip on the web between two successive frames)
CB	Color Blue
CC	Color Compensation
CSA	Canadian Standards Association
DF	Darkfield
DIC	Differential Interference Contrast
DIN	Deutsches Institut für Normung (German Standardization Institute)
DX	Film speed coding
EN	European standard
FL	Fluorescence
foc.	focusing (eyepiece)
IEC	International Electrotechnical Commission
IP	Index of Protection (enclosure)
ISO	International Organization for Standardization
L	Length of scaling bar
LCD	Liquid Crystal Diode
MC	Microscope Camera
PH	Phase contrast
PIC	Picture (data strip inside the frame)
PL	Plane-field eyepieces (E-, W-, K- in front of PL designate the correction type)
SK	Protection class
UL	Underwriter Laboratories
VDE	Verband Deutscher Elektrotechniker (Association of German Electrical Engineers)
Vobj	Objective magnification
VZ	Intermediate magnification

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